CLAIMS

1. (1) A polypeptide comprising an amino acid sequence consisting of 129th to 3657th amino acids in the amino acid sequence of SEQ ID NO: 2, or (2) a polypeptide exhibiting an SMG-1 activity and comprising an amino acid sequence in which one or plural amino acids are deleted, substituted, and/or inserted at one or plural positions in an amino acid sequence consisting of 129th to 3657th amino acids in the amino acid sequence of SEQ ID NO: 2.

2. A polypeptide exhibiting an SMG-1 activity and comprising an amino acid sequence having a 90% or more homology, with an amino acid sequence consisting of 129th to 3657th amino acids in the amino acid sequence of SEQ ID NO: 2, with an amino acid sequence consisting of 1st to 3657th amino acids in the amino acid sequence of SEQ ID NO: 2, or with an amino acid sequence consisting of 107th to 3657th amino acids in the amino acid sequence of SEQ ID NO: 2.

3. A polypeptide consisting of the amino acid sequence of SEQ ID NO: 2.

4. A polynucleotide encoding the polypeptide according to any one of claims 1 to 3.

5. An expression vector comprising the polynucleotide according to claim 4.

6. A cell transfected with the expression vector according to claim 5.

7. An antibody or a fragment thereof, which binds to the polypeptide according to any one of claims 1 to 3.

8. A knock-out non-human animal wherein an expression of a gene encoding the polypeptide according to any one of claims 1 to 3 is partially or completely suppressed.

9. A method for screening a substance which modifies an SMG-1 activity of the polypeptide according to any one of claims

1 to 3, comprising the steps of:
bringing into contact (1) the polypeptide, (2) Upf1/SMG-2, a fragment thereof capable of being phosphorylated, or a fusion polypeptide comprising Upf1/SMG-2 or the fragment thereof, and (3) a substance to be tested; and
carrying out phosphorylation under the conditions that the polypeptide is brought into contact with Upf1/SMG-2, the fragment thereof, or the fusion polypeptide, and analyzing whether or not Upf1/SMG-2, the fragment thereof, or the fusion polypeptide is phosphorylated.

10. A method for screening a substance which modifies an SMG-1 activity of the polypeptide according to any one of claims 1 to 3, comprising the steps of:
bringing (1) the polypeptide into contact with (2) a substance to be tested; and
carrying out phosphorylation under the conditions that the polypeptide is brought into contact with the substance to be tested, and analyzing whether or not the polypeptide is autophosphorylated.

11. An agent for suppressing nonsense-mediated mRNA decay, comprising, as an active ingredient, a substance which is obtained by the screening method according to claim 9 or 10 and modifies an SMG-1 activity of the polypeptide according to any one of claims 1 to 3.

12. An agent for suppressing nonsense-mediated mRNA decay, comprising as an active ingredient, an inhibitor of a phosphatidyl inositol kinase related kinase.

13. An agent for treating and/or preventing a disease caused by a premature translation termination codon generated by a nonsense mutation, comprising, as an active ingredient, a substance which is obtained by the screening method according to claim 9 or 10 and modifies an SMG-1 activity of the polypeptide according to any one of claims 1 to 3.

14. An agent for treating and/or preventing a disease caused

by a premature translation termination codon generated by a nonsense mutation, comprising as an active ingredient, an inhibitor of a phosphatidyl inositol kinase related kinase.

15. An agent for suppressing nonsense, comprising as an active ingredient, (1) an SMG-1-acitivity-deficient mutant, or an inhibitor of a phosphatidyl inositol kinase related kinase, and (2) an aminoglycoside antibiotic.

16. An agent for suppressing nonsense, comprising, as an active ingredient, an SMG-1-acitivity-deficient mutant, or an inhibitor of a phosphatidyl inositol kinase related kinase.

17. An agent for promoting nonsense-mediated mRNA decay, comprising as an active ingredient, (1) the polypeptide according to any one of claims 1 to 3, (2) a substance which promotes an SMG-1 activity of the polypeptide, or (3) the polynucleotide according to claim 4.

18. A method for identifying a nonsense mutation point in a gene, comprising the steps of:

culturing a cell to be tested which is obtained from a subject to be tested and may contain a gene having a nonsense mutation by a premature translation termination codon, in the presence of an inhibitor of an SMG-1 activity; and

analyzing molecular weight of a polypeptide derived from the gene in the cultured cell.

19. A method for detecting a gene having a nonsense mutation, comprising the steps of:

culturing at least two groups of cells to be tested which are obtained from a subject to be tested and may contain a gene having a nonsense mutation by a premature translation termination codon, in the presence of an inhibitor of an SMG-1 activity and in the absence thereof, respectively; and

detecting a presence or absence of the difference of an amount of mRNA derived from the gene in the cultured cells.